

WHAT IS CLAIMED IS:

1. A photomask for patterning fine features comprising:
 - a first masked feature;
 - a first transmitting nonprinting window substantially entirely enclosed within a perimeter of the first masked feature; and
 - a first transmitting area substantially entirely surrounding the perimeter of the first masked feature in the plane of the photomask, wherein light transmitted through the first window, after transmission through the first window, is in a first phase, and light transmitted through the first transmitting area, after transmission through the first transmitting area, is in a second phase substantially opposite the first phase.
2. The photomask of claim 1 wherein the first phase is 180 degrees and the second phase is zero degrees.
3. The photomask of claim 2 wherein the first window comprises a first alternating phase shifter.
4. The photomask of claim 3, wherein the first masked feature further comprises at least a second alternating phase shifter.
5. The photomask of claim 3 wherein the first alternating phase shifter is substantially entirely surrounded in the plane of the photomask by blocking material.
6. The photomask of claim 5 wherein the blocking material comprises chromium.
7. The photomask of claim 5 wherein the blocking material comprises molybdenum silicide.

8. The photomask of claim 1 wherein the first phase is zero degrees and the second phase is 180 degrees.
9. The photomask of claim 8 wherein the first transmitting area comprises an alternating phase shifter.
10. The photomask of claim 9 wherein the first window is substantially entirely surrounded in the plane of the photomask by blocking material.
11. The photomask of claim 10 wherein the blocking material comprises chromium.
12. The photomask of claim 1 wherein the largest dimension of the first window is less than about 130 nm times a projected scaling factor and wherein light projected through the photomask has a wavelength of about 248 nanometers or more.
13. The photomask of claim 1 wherein the largest dimension of the first window is less than about 100 nm times a projected scaling factor and a wavelength of light projected through the photomask mask is greater than about 193 nanometers.
14. The photomask of claim 1, wherein the window has a polygonal, round, or frame shape.
15. The photomask of claim 1 further comprising:
 - a plurality of masked features, wherein the plurality of masked features includes the first masked feature, and each of the plurality of masked features comprises a transmitting, nonprinting window substantially entirely enclosed within a perimeter of the masked feature; and
 - a transmitting area commonly and substantially entirely surrounding the masked features in the plane of the photomask, wherein for each masked feature, light transmitted through the window, after transmission through the window, is in the first phase, and

light transmitted through the transmitting area, after transmission through the transmitting area, is in the second phase.

16. The photomask of claim 15 wherein the plurality of masked features are substantially evenly spaced islands.

17. The photomask of claim 15 wherein the plurality of masked features are substantially parallel substantially evenly spaced lines.

18. A photomask for patterning fine features comprising a first nonprinting alternating phase shifter wherein:

light transmitted through the photomask reaching a photoresist surface substantially entirely within a perimeter of a projected photoresist feature is in a first phase, and

light reaching a photoresist surface outside and in proximity to the perimeter of the projected photoresist feature, on all sides of the projected photoresist feature, is in a second phase substantially opposite the first phase.

19. The photomask of claim 18 wherein the first phase is 180 degrees and the second phase is zero degrees.

20. The photomask of claim 18 further comprising a first masked feature, wherein the first phase shifter is substantially entirely enclosed within a perimeter of the first masked feature.

21. The photomask of claim 20 wherein the first phase shifter is surrounded in the plane of the photomask by blocking material.

22. The photomask of claim 21 wherein the blocking material is chromium.

23. The photomask of claim 21 wherein the blocking material is molybdenum silicide.

24. The photomask of claim 20 further comprising a plurality of masked features, each comprising an alternating phase shifter within a perimeter of each masked feature.
25. The photomask of claim 18 wherein the first phase is zero degrees and the second phase is 180 degrees.
26. The photomask of claim 25 further comprising:
- a first nonprinting window substantially entirely enclosed within a perimeter of a first masked feature; and
 - a first transmitting area substantially entirely surrounding the perimeter of the first masked feature in the plane of the photomask, the first transmitting area comprising the first alternating phase shifter.
27. The photomask of claim 26 wherein the first window is surrounded in the plane of the photomask by blocking material.
28. The photomask of claim 27 wherein the blocking material is chromium.
29. A patterned feature on a semiconductor device, said patterned feature patterned from a masked feature in a photomask, said photomask comprising:
- a transmitting nonprinting window, the window substantially entirely enclosed within a perimeter of the masked feature; and
 - a transmitting area, the transmitting area substantially entirely surrounding the perimeter of the masked feature in the plane of the photomask, wherein either the window or the transmitting area comprises an alternating phase shifter.
30. The patterned feature of claim 29, wherein the window comprises the alternating phase shifter.

31. The patterned feature of claim 29, wherein the transmitting area comprises the alternating phase shifter.
32. A plurality of patterned features on a semiconductor device, said features patterned from masked features in a photomask,
each of said masked features comprising a nonprinting window substantially entirely enclosed within a perimeter of the masked feature, and
each of said masked features substantially entirely surrounded in the plane of the photomask by a common transmitting area, wherein either the window or the transmitting area comprises an alternating phase shifter.
33. The patterned features of claim 32 wherein, for each masked feature, the window comprises the alternating phase shifter.
34. The patterned features of claim 32, wherein the transmitting area comprises the alternating phase shifter.
35. The patterned features of claim 32 wherein the patterned features comprise substantially evenly spaced pillars.
36. The patterned features of claim 35 wherein the pillars comprise polysilicon.
37. The patterned features of claim 36 wherein the pillars are portions of memory cells.
38. The patterned features of claim 37 wherein the memory cells are a portion of a first memory level at a first height above a substrate.
39. The patterned features of claim 38 wherein the first memory level is in a monolithic three dimensional memory array comprising at least a second memory level formed at a second height above the substrate, the second height different from the first height.

40. The patterned features of claim 32 wherein the patterned features comprise substantially parallel evenly spaced lines.
41. The patterned features of claim 40 wherein the lines comprise tungsten.
42. The patterned features of claim 41 wherein the lines are conductors in a memory array.
43. The patterned features of claim 42 wherein the conductors are a portion of a first memory level at a first height above a substrate.
44. The patterned features of claim 43 wherein the first memory level is in a monolithic three dimensional memory array comprising at least a second memory level formed at a second height above the substrate, the second height different from the first height.
45. A photomask for patterning fine features comprising a first nonprinting alternating phase shifter, the phase shifter substantially entirely enclosed within a perimeter of a first masked feature.
46. The photomask of claim 45 wherein light transmitted through the first phase shifter is in a phase of 180 degrees.
47. The photomask of claim 45 wherein the first phase shifter is substantially entirely surrounded in the plane of the photomask by blocking material.
48. The photomask of claim 47 wherein the blocking material is chromium.
49. The photomask of claim 47 wherein the blocking material is molybdenum silicide.

50. The photomask of claim 45 wherein the largest dimension of the first phase shifter is less than about 130 nanometers times a projected scaling factor and wherein light projected through the photomask has a wavelength of about 248 nanometers or more.
51. The photomask of claim 45 wherein the largest dimension of the first phase shifter is less than about 100 nanometers and a wavelength of light projected through the photomask is greater than about 193 nanometers.
52. The photomask of claim 45 wherein the first masked feature further comprises at least a second alternating phase shifter.
53. The photomask of claim 45 wherein the first phase shifter has a polygonal, round, or frame shape.
54. The photomask of claim 45 further comprising a plurality of masked features, wherein the plurality of masked features includes the first masked feature, and each of the plurality of masked features comprises an alternating phase shifter substantially entirely enclosed within a perimeter of the masked feature.
55. The photomask of claim 54 wherein the plurality of masked features are substantially evenly spaced islands.
56. The photomask of claim 54 wherein the plurality of masked features are substantially parallel substantially evenly spaced lines.
57. A photomask for patterning fine features comprising:
a first nonprinting transmitting window substantially entirely enclosed within a perimeter of a first masked feature; and
a transmitting area substantially entirely surrounding and in proximity to the perimeter of the first masked feature in the plane of the photomask, wherein the transmitting area operates as a first alternating phase shifter.

58. The photomask of claim 57 wherein light transmitted through the first window is not phase shifted relative to incident light.
59. The photomask of claim 58 wherein the first window is substantially entirely surrounded in the plane of the photomask by blocking material.
60. The photomask of claim 59 wherein the blocking material is chromium.
61. The photomask of claim 57 wherein the largest dimension of the first window is less than about 130 nanometers times a projected scaling factor and wherein light projected through the photomask has a wavelength of about 248 nanometers or more.
62. The photomask of claim 57 wherein the largest dimension of the first window is less than about 100 nanometers and a wavelength of light projected through the photomask is less than 248 nanometers.
63. The photomask of claim 57, wherein the first masked feature further comprises at least a second nonprinting transmitting window.
64. The photomask of claim 57, wherein the first window has a polygonal, round, or frame shape.
65. The photomask of claim 57 further comprising a plurality of masked features, wherein:
the plurality of masked features includes the first masked feature,
each of the plurality of masked features comprises a nonprinting transmitting window enclosed within a perimeter of the masked feature, and
the plurality of masked features are commonly and substantially entirely surrounded by the transmitting area.

66. The photomask of claim 65 wherein the plurality of masked features are substantially evenly spaced islands.
67. The photomask of claim 65 wherein the plurality of masked features are substantially parallel substantially evenly spaced lines.
68. A method of forming a plurality of substantially evenly spaced pillars, the method comprising:
- forming a layer of a first material;
 - depositing photoresist on the first material;
 - patterning the photoresist using light having a wavelength of about 248 nm or more;
 - etching the first material to form the plurality of substantially evenly spaced pillars, the pillars having a pitch between about 220 and about 280 nm.
69. The method of claim 68 wherein the first material is a semiconductor.
70. The method of claim 69 wherein the semiconductor is silicon.
71. The method of claim 70 wherein the silicon is polycrystalline.
72. The method of claim 68 wherein the pillars are portions of memory cells.
73. The method of claim 72 wherein the memory cells are a portion of a first memory level at a first height above a substrate.
74. The method of claim 73 wherein the first memory level is in a monolithic three dimensional memory array comprising at least a second memory level formed at a second height above the substrate, the second height different from the first height.
75. The method of claim 68 wherein the pitch is about 260 nm.